White (and Black) Rocks

Heritage Newsletter

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White (and Black) Rocks by Dr Peter Wilson

The location and name of the White Rocks need little introduction. The place must surely be known to all those who live in Portrush as well as many from elsewhere who choose to visit the eastern end of the East Strand. The name is self-explanatory – the rocks are white, it cannot be any simpler. In fact the story of the rocks is a little more complex, or a bit more involved. Yes, there is white rock at the White Rocks, but black rocks that cut through and overlie the white ones also occur. And in places lumps of black rock are enclosed within the white rock. So, what's been going on? When did the white and black rocks form and how did they come to be a bit mixed up?

The white rock is limestone and is a part of the Ulster White Limestone Formation, to give it its Sunday name. It is of Cretaceous age – the geological system between 145 and 65 million years ago, and is sometimes referred to as Cretaceous Chalk. More particularly the limestone formed in the latter half of the Cretaceous - 100-80 million years ago. The limestone is equivalent to the chalk of southern England that can be seen at the White Cliffs of Dover, Beachy Head and the Needles on the Isle of Wight. However, there is a difference, the Ulster White Limestone is considerably harder than the English chalk as a result of being baked and compacted by the eruption of and burial by the black basaltic rocks, of which more later.

At the time the limestone formed, the area that eventually became Ireland was submerged beneath a warm, clear and shallow sea. This sea accommodated forms of microscopic plankton. When the plankton died the calcareous discs contained within the organisms, known as Coccoliths, fell to the sea bed and formed an ooze or muddy sediment that ultimately became the fine-grained white limestone.

Photo 1: Limestone (white) and basalt (black) in the former quarry (Long Gilbert) alongside Dunluce Road, above the White Rocks. The 'clay with flints' is hidden by the grassy strip.

The limestone also contains the remains of shells and squid-like creatures called Belemnites. In addition there is much flint to be seen in the limestone cliffs in the form of nodules and sheets. Flint is a very fine-grained form of amorphous silica that breaks with a smooth conchoidal (concave-convex) fracture with very sharp edges.

This property endeared it to the earliest settlers in Ireland who used it to fashion tools such as arrowheads, blades and scrapers.

How the flint formed in the first place has exercised many geological minds. Some flint seems to have been contemporary with the accumulating limey mud as sediment-filled burrows in the mud were transformed to silica. Other flint appears to have been formed by silica deposition from water percolating along joints and fissures after the muds had hardened to limestone. However it formed, it now shows as distinctive lumps and bands that display a range of colour, although the grey variety is perhaps the most common.

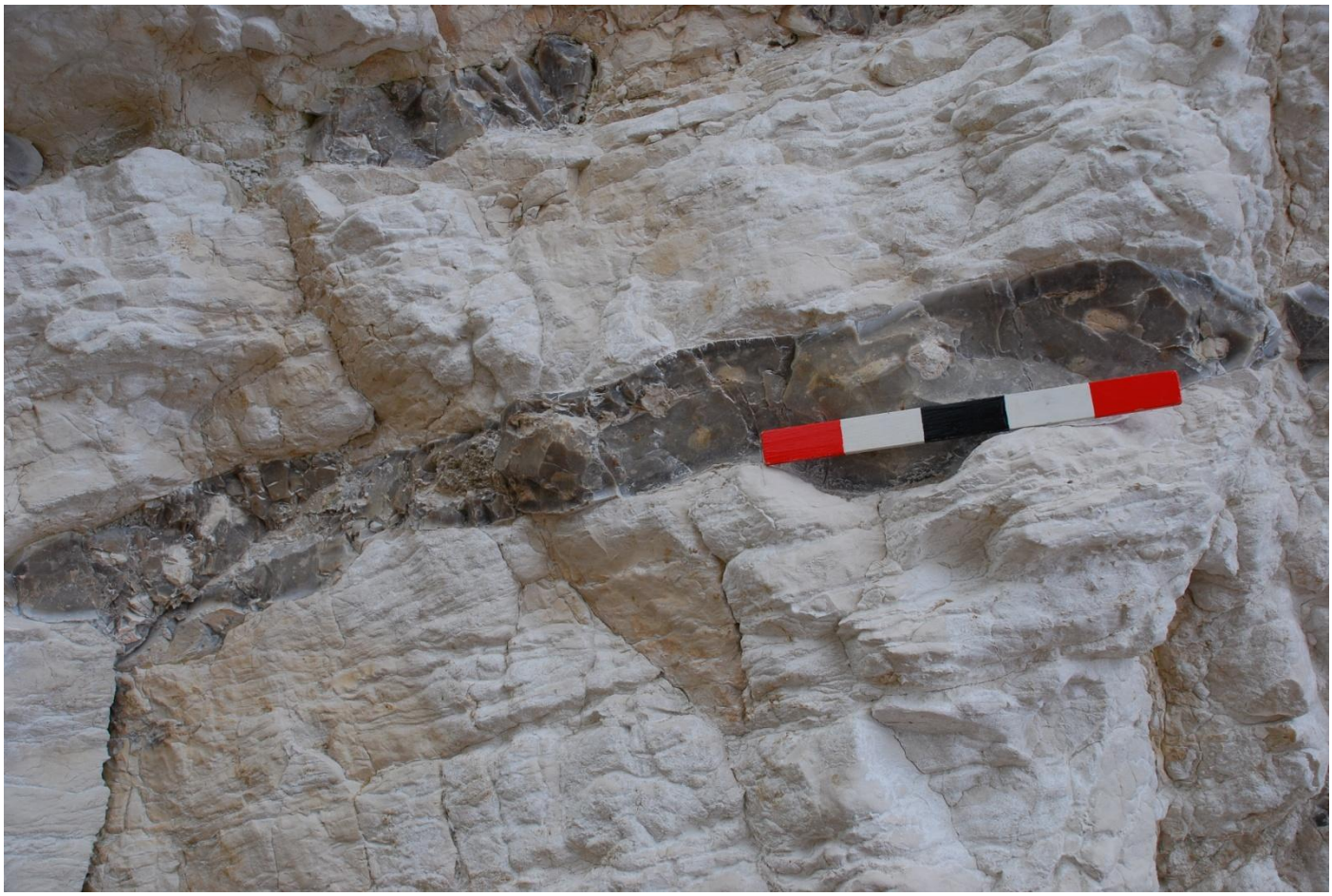

Photo 2. Flint band in limestone at the White Rocks. Scale bar is 30 cm in length.

The newly formed limestone was then subjected to folding and faulting, and it was raised to above sea level. This resulted in weathering and erosion of the limestone and gave rise to a surface material known by geologists as ‘clay with flints’. It is sometimes possible to see remnants of this material between the limestone and the overlying basalt in the roadside quarry. It is brown in colour but is largely hidden behind the grassy strip at the limestone-basalt junction as seen in Photo1. The ‘clay with flints’ represents a lengthy period of relatively benign conditions in which vegetation flourished and soil developed. All this ended with the outpouring of molten rock that eventually solidified and to which we apply the name basalt.

The black basalt that caps the limestone at the White Rocks in Photo 1 does not attract much attention. This may be because it does not display the spectacular columns that can be seen at the Giant’s Causeway, so tends to be ignored.

However, down on the beach at the White Rocks there is a small area of basalt that, although partly obscured by vegetation, is nevertheless an important locality with respect to the limestone-basalt relationship and is worth seeking out. The basalt is part of the Antrim Lava Group (Sunday name again!) formed in the early part of Palaeogene times around 60-55 million years ago. The lavas result from extrusive volcanic activity and at the White Rocks one of the numerous explosive vents through which the magma poured can be seen. The vent takes the form of a broad embayment in the line of the limestone cliffs.

Photo 3. Area of basalt vent (largely grass covered) with limestone to either side at the White Rocks.

Once again there is much vegetation obscuring the detail but enough can be seen for this to have been recognized as a location at which explosive upwelling and outpouring of magma occurred. The explosions were strong enough to actually shatter a great thickness of limestone and flints and send it some considerable distance up into the air.

As the fragments fell back to earth, lumps of newly formed basalt were incorporated into the boulder pile. Since this happened the pile of shattered rock has been re-cemented by natural processes and is known as a volcanic agglomerate (Photos 4 and 5). The vent basalt itself is also an agglomerate, close examination will show it to consist of basalt fragments that are welded together.

Photo 4. Limestone pinnacle at the White Rocks. The pinnacle consists of large pieces of shattered limestone and smaller flints and incorporates lumps of basalt from the vent explosion that ripped through the limestone.

Today, at appropriate times the White Rocks attract sun-seekers, strollers and surfers, some of whom will rest at the base of the rock outcrops. At their fingertips is a significant part of the geological heritage of north Antrim that tells of warm sub-tropical seas during the Cretaceous and violent volcanic eruptions of the Palaeogene.

Photo 5. Close up of the debris of the vent explosion showing lumps of black basalt and fragmented flint enclosed within the re-cemented limestone.

Our thanks to Peter for this excellent contribution to our series of Heritage Newsletters.
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